

GAO

Report to the Chairman, Committee on
Armed Services, U.S. Senate

March 1999

MILITARY OPERATIONS

Status of DOD's Efforts to Develop Future Warfighting Capability



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National Security and
International Affairs Division

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March 31, 1999

The Honorable John Warner
Chairman, Committee on
Armed Services
United States Senate

Dear Mr. Chairman:

The Department of Defense (DOD) is implementing a plan designed to meet the critical security challenges of the future by transforming the Armed Forces into a joint force capable of meeting the requirements of 21st century operations. A key element of achieving this transformation is the conduct of joint warfighting experimentation, which involves assessing joint warfighting concepts that could lead to changes to doctrine, organization, training and education, materiel, leadership, and personnel (DOTMLP). As agreed with your office, this letter responds to the Senate Committee on Armed Services' report on the fiscal year 1999 DOD Authorization Act and (1) describes the status of DOD's efforts to implement its joint experimentation program, (2) identifies some of the factors that we believe contribute to the success of a joint experimentation program, and (3) provides answers to the issues posed in the report regarding the extent of DOD's support for future warfighting.

Results in Brief

DOD is beginning to implement its future warfighting vision and joint experimentation, both of which are formidable efforts. It has done a significant amount of work in establishing the processes to implement both efforts, but it is too early to assess their success. Joint Vision (JV) 2010 is the conceptual template for future joint warfighting. To provide joint policy and guidance for the implementation of JV 2010 in December 1998, the Joint Staff published the Joint Vision Implementation Master Plan (JIMP). The Chairman, Joint Chiefs of Staff (CJCS), is responsible for JV 2010 implementation. The U.S. Atlantic Command (USACOM), designated by the Secretary of Defense as executive agent for joint experimentation, is responsible for concept development, assessment, and experimentation within the program to implement JV 2010.

USACOM's role as executive agent for joint experimentation is less than a year old. In that time, it has developed a plan to implement its responsibilities, which includes a detailed joint experimentation process and an organization to implement it. It also has developed its first Joint

Experimentation Campaign Plan (CPLAN), which identifies the first advanced warfighting concepts and supporting experimentation events that will be undertaken during fiscal years 1999-2001. A key early element of its CPLAN is the proof of process experiment, scheduled for completion in November 1999, which will be used to validate the experimentation process. USACOM is still building its staff and the first experiment events are just beginning. Because it takes time to staff a new organization, USACOM officials report that in their first year of operation they have not been able to do as much as they had hoped to do.

Since experiments are just beginning in 1999 and the proof of process experiment will not be completed until late 1999, necessary data will not be available for at least a year for anyone to make a preliminary assessment of how well the joint experimentation process is working in practice and for several years to thoroughly assess whether joint experimentation is achieving the results envisioned by the Secretary of Defense and the Congress. To aid the Committee in its oversight of joint experimentation in the interim, we have identified what we believe are important initial factors in a successful joint experimentation program. These factors include whether joint experimentation is becoming institutionalized within DOD, the extent to which joint experimentation includes exploring changes in doctrine and organization as well as technology, and the extent to which USACOM is establishing linkages with other DOD organizations exploring future warfighting. This last factor is particularly important since USACOM places heavy emphasis on leveraging other DOD components' experimentation.

The Committee's report directed us to examine a number of issues related to the extent of DOD's support for implementing JV 2010, including the extent to which it is supported by the JIMP, the Secretary of Defense's and CJCS's guidance on DOD priorities, and the defense science and technology plans. Table 1 states the issues and provides a summary of our responses. Our detailed responses are in appendixes I through VI.

Table 1: JV 2010 and Joint Experimentation Issues and Our Answers

Issue	Answer
Does the JIMP reflect a viable time line and adequate resources to achieve the operational concepts of the vision by 2010 and incorporate the operational challenges and desired force characteristics described in the report of the National Defense Panel (NDP); is funding for the execution of the JV 2010 assessment roadmaps adequately reflected in the Future Years Defense Program (FYDP); and are service plans for experimentation activities consistent with these roadmaps?	For the most part. The JIMP provides joint policy and guidance to implement JV 2010. It does not nor was it intended, to discuss time lines and resources. The JIMP describes the year 2010 as a way point rather than an end point for achieving JV 2010 capabilities. The JIMP incorporates all of the NDP's operational challenges and desired force characteristics. Responsibility for the assessment roadmaps was transferred to USACOM as executive agent for joint experimentation. The fiscal years 2000-2005 FYDP will contain funding for USACOM, whose planned experiments should be consistent with the services' events since USACOM plans to utilize them. (See app. I.)
Is the plan for the development of joint enablers adequate to implement the operational concepts of JV 2010 by 2010?	No, but it is a beginning. Joint enablers—such as command, control, communications, computers, intelligence, surveillance, and reconnaissance—comprise over half of the JIMP's 72 desired operational capabilities to implement JV 2010. USACOM's experiment plan begins to address joint enablers but does not go beyond 2001. (See app. II.)
Are the fielding of advanced technologies, the preparation of forces, and the funding support for the joint experimentation plan reflected in the Defense Planning Guidance for fiscal years 2000 through 2005 and the subsequent budget and planning review process documents?	They are not reflected in most recent documents but are expected to be reflected in future documents. While the defense guidance contains considerable discussion of JV 2010, it and associated budget and planning review process products mostly make limited or no mention of joint experimentation or the fielding of advanced technology and preparation of forces for the joint experimentation plan. This is partly due to these documents preceding the joint experimentation program. They are expected to discuss joint experimentation in 1999. There is no complete picture of funding support for joint experimentation, JV 2010, and defense transformation activities. (See app. III.)
What are the views in the modeling and simulation community as to the capability and limitations of existing and developing models and simulations to support the joint experimentation process?	The ability to model or simulate important elements of future warfighting is not within DOD's current capability. It may be a decade or more before such capabilities exist. (See app. IV.)
Do the Defense Science and Technology Strategy, the Basic Research Plan, the Defense Technology Area Plan, and the Joint Warfighting Science and Technology Plan synchronize the fielding of advanced technologies across the services to support the development of joint capabilities?	To a great extent. The plans are linked to each other. We found almost all of the key future technology needs for the Army and Navy reflected in these plans. (See app. V.)
How does USACOM's charter compare to the Joint Forces Command recommended by the NDP and what is USACOM's capability to implement its charter?	While the charter establishing USACOM as executive agent for joint experimentation did not address any of the NDP recommendations regarding the framework for a Joint Forces Command, USACOM's Joint Experimentation Implementation Plan (IPLAN) followed the framework for 10 of the 17 recommendations and part of an 11 th recommendation. USACOM has established a joint experimentation process and is beginning to implement it. (See app. VI.)

Source: GAO.

Background

On May 1, 1996, the CJCS approved a document entitled Joint Vision 2010. This document responded to a recommendation in the Commission on Roles and Missions' May 1995 report that the CJCS propose a joint warfighting vision to help guide service force development efforts. It, along with future concepts documents, is to guide joint warfighting experimentation. JV 2010 describes how technological innovations and information superiority will allow the services to use four new operational concepts—dominant maneuver, precision engagement, full dimensional protection, and focused logistics—in future conflicts. The synergy of these new concepts is described as defining the end state of the vision—full spectrum dominance, the ability to dominate the full range of military operations from humanitarian assistance, through peace operations, up to and into the highest intensity conflict. The Joint Staff is responsible for overseeing JV 2010 implementation. To provide further guidance for achieving future joint warfighting capabilities, in December 1998 the Joint Staff published the JIMP.

On May 15, 1998, the Secretary of Defense chartered USACOM to serve as the DOD executive agent for joint experimentation, effective October 1, 1998, and directed the development of an implementation plan. As executive agent, USACOM is to plan, conduct, and assess joint experiments, synchronize service experimentation efforts, and provide “best value-added” recommendations for changes to DOTMLP based on the results of those experiments. The charter made USACOM responsible for concept development, assessment, and experimentation within the CJCS program to implement JV 2010 and future warfighting visions.

USACOM Is Making Progress in Establishing a Joint Experimentation Program

USACOM has had to perform three critical tasks concurrently to meet its responsibilities as executive agent for joint experimentation—create a joint experimentation capability, develop a joint experimentation plan, and execute the plan. In anticipation of, and to accomplish, this mission, it began working on the preparation phase in April 1998, with the establishment of the joint experimentation concept team. This team developed the IPLAN and the joint experimentation process, and on September 1, 1998, this team became the USACOM Joint Experimentation (J9) Directorate. Both the organization and the process will evolve as the joint experimentation program matures.

USACOM has taken a number of steps to implement its joint experimentation responsibilities. In addition to developing the IPLAN and

the joint experimentation process, it has identified resource requirements, completed the first CPLAN, and begun preparation for the first experiments.

The Joint Experimentation Process

The IPLAN, dated July 14, 1998, documents USACOM's concept for executing its mission. It establishes an eight-element experimentation process and describes how USACOM will task organize to accomplish the mission (see table 2).

Table 2: Elements of the Joint Experimentation Process

Element	Description
Concept development	Assimilates strategic guidance and other inputs from the combatant commanders, services, non-DOD agencies, private sector, and others. From this compilation of information, the J9 Directorate refines and further develops concepts for joint experimentation.
Campaign planning	Develops a multiyear CPLAN detailing a series of experiments addressing each of the concepts selected for experimentation.
Experimentation plan development	Each concept approved for experimentation will be fully developed in a white paper describing the concept and desired capabilities in sufficient detail for implementation by the warfighter. The paper also will contain the experimental hypotheses for defining the objectives for each experiment event, which provide the basis for the experimentation plan. Experimentation plans will identify events required to assess the concept and provide the information required to select, design, schedule, and develop the events to be executed.
Experiment design	Experiment management plans are developed for events identified in the experiment plans. The management plan may include measures of effectiveness and performance, a data collection plan, an analysis plan, and a modeling and simulation plan. Experiment objectives are defined and experiments, demonstrations, and exercises being conducted throughout DOD are examined to determine the extent to which they can be leveraged to support USACOM's experiment objectives.
Experiment preparation	Establishes the experiment control cell and develops the experiment training, support, and technical support plans.
Experiment conduct	The hypothesis testing and data generation portion of the process.
Assessment	Data collected is analyzed in accordance with the analysis plan and results in two major outputs: (1) an initial after action report and (2) a final report based on more extensive analysis of the data with conclusions and recommendations.
Integration	Examines the results of all experiments pertaining to a given concept, as well as information available from other sources, and draws conclusions about the utility of the concept and the value-added to joint operations. After extensive review, these conclusions become recommendations for new DOTMLP actions required to implement the concept.

Source: USACOM's IPLAN.

Resource Requirements

USACOM has identified its resource requirements, both for personnel and funding, and it is anticipating rapid personnel growth over a 3-year period. In November 1998, the USACOM J9 Directorate had 27 military and civilian personnel.¹ It had a staffing goal of 127 military and DOD civilian personnel by September 1999, but it now expects to have 58 people, including 30 military personnel, by that date. By October 2001, USACOM officials told us that their goal is to have staffing of 161 personnel, including 126 military and DOD civilian personnel and 35 reimbursable personnel from other organizations. The Office of the Secretary of Defense has authorized the 126 military and DOD civilian personnel for both fiscal years 2000 and 2001. The reimbursable personnel do not require Office of the Secretary of Defense authorization. USACOM officials told us that because it takes time to staff a new organization, in their first year of operation they have not been able to do as much as they had hoped to do.

Because joint experimentation is a new mission, it was not included in the President's fiscal year 1999 budget or the FYDP, so DOD transferred funds from other accounts. USACOM requested \$41 million for the J9 Directorate in fiscal year 1999 and DOD agreed to fund \$30 million.² Initially, \$14.1 million was provided to USACOM, of which it has actually received \$12.48 million. USACOM officials believe that this amount is sufficient to last until March 1999. The balance is to come from a \$16-million reprogramming action approved by DOD and expected to be submitted to the Congress in early 1999. USACOM officials told us that they expect to receive those funds in April 1999. In addition, DOD has included \$350 million for joint experimentation for fiscal years 2000-2005 in the FYDP. Joint Staff officials told us that additional funding may be added in fiscal years 2004 and 2005 to fund an additional joint experiment in each of those years.

In April 1999, USACOM will lease a commercial building that is currently under construction to house its joint experimentation personnel and battle laboratory. Long-range plans include repairing an existing Navy-owned facility on Naval Air Station Norfolk as a permanent location for the J9 Directorate, with a planned occupancy date in fiscal year 2001.

¹The J9 Directorate was augmented by about 50 reservist and contractor personnel who are available for varying periods of time.

²Current resource estimates include funds for initial experimentation efforts, operation and maintenance funding, facilities for operations, contractor support, communications and information systems, and experimentation forces and logistics support.

The CPLAN

The first CPLAN, known as CPLAN 99, was submitted by USACOM for CJCS approval in December 1998, with CJCS review expected in late February or early March 1999. It covers fiscal years 1999-2001. The second CPLAN, which is to cover a 6-year period, is scheduled to be issued in spring 1999.

CPLAN 99 identified the first group of advanced warfighting concepts to be studied in the joint experimentation program. These concepts were selected through the concept development process described in the IPLAN experimentation process. Concept development and selection for CPLAN 99 began with a concept development workshop and a review of concept papers from various sources. Rating the concepts as to their suitability, feasibility, appropriateness, and acceptability, the workshop attendees identified eight concepts as having the greatest potential for early experimentation. The eight concepts are:

- attack operations against critical mobile targets,
- future collaborative information environment,
- common relevant operational picture,
- interoperable combat identification,
- adaptive joint command and control,
- joint contingency force operations,
- focused logistics: enabling early decisive operations, and
- surveillance and fires from space.

USACOM will use three types of events to assess concepts. These are (1) USACOM-generated events; (2) major-leveraged events where USACOM plays a major role in previously scheduled events of a combatant commander, service, or agency, including adding components to the experiment to meet USACOM's experiment needs; and (3) minor-leveraged events where USACOM plays a reduced role in previously scheduled events of a combatant commander, service, or agency, which does not involve adding any components to the experiment.

To leverage previously scheduled experiment events, USACOM has begun to establish linkages with the services, the defense agencies, and the national laboratories on future warfighting efforts. It has had discussions with the Army Training and Doctrine Command, the Navy's Maritime Battle Center, the Air Force's Expeditionary Force Experiment group, the Marine Corps Warfighting Laboratory, the Defense Advanced Research Projects Agency, and national laboratories such as Los Alamos National Laboratory. We gathered information using a data collection instrument from

14 organizations across the services, combatant commands, and national laboratories about their future warfighting efforts and relationships with USACOM. Nine of the 14 organizations said that a linkage had been established with USACOM. For example, the U.S. Central Command, the Marine Corps Warfighting Laboratory, and the Army's Battle Laboratory Integration, Technology, and Concepts Division reported that they have had direct contact with the J9 Directorate. Three of the remaining five organizations anticipate establishing linkages with USACOM in the near future.

USACOM provided us with a list of 88 experiment events to be conducted over the next 3 years. Experiment events are focused on three different time phases—near-, mid-, and far-term. According to the CPLAN, the near-term phase, which covers the next 6 years, focuses on improving current capabilities; the mid-term phase, which is the 4 to 18-year period from now, focuses on achieving JV 2010 operational capabilities, and the far-term phase, which is the 15- to 25-year period from now, focuses on developing revolutionary concepts. The most detailed planning for the 88 experiment events has been for those that address the mid-term phase. A total of 42 mid-term-oriented experiments are detailed in a synchronization matrix that identifies each event, the fiscal year and quarter when it is scheduled to be conducted, and the advanced warfighting concepts to be assessed. The matrix will be updated as new experiments are identified. There is no similar matrix for the other 46 events.

The first leveraged experiment events will involve face-to-face contacts with the service sponsor to arrange for USACOM participation. The first agreement has been reached with the Navy's Maritime Battle Center for the Center to identify the contribution that Fleet Battle Experiment "Echo" can make to USACOM joint experimentation goals and to design a coordination process to allow USACOM to leverage off service experiments. The agreement calls for the Center to provide a report on both the coordination process and the results of the fleet battle experiment.

A key part of the first year's experimentation, designed to validate organizational structure and relationships and resource requirements, is the proof of process experiment that USACOM has selected. It is scheduled to be conducted between July 15 and August 15, 1999. The data analysis is scheduled to occur from August 15 through November 15, 1999. The final report is scheduled for completion on November 30, 1999.

To address the far-term phase of joint experimentation, USACOM hosted a futures program workshop with representatives from DOD, the services, government, industry, and academia to identify potential concepts for future evaluation. Using a construct based on descriptions of views of the future, attendees looked for common concepts or capabilities that would be needed by future warfighters to meet multiple scenarios. The attendees identified the following eight areas for focus as far-term concepts.

- Mastery of information
- Bio-centric operations and counters
- Space operations
- Organizing for military operations
- Weapons of mass effects
- Operational and strategic sanctuaries
- Autonomous operations
- Global power projection

Some Important Initial Factors of a Successful Joint Experimentation Program

Because actual experiments are just beginning and the proof of process experiment will not be completed before November 1999, we believe that a preliminary assessment of how well the joint experimentation process is working cannot be made by anyone before early in the year 2000 because the necessary data will not be available for at least a year. Since the final phase of the joint experimentation process leading to recommendations for changes to DOTMLP involves examining the results of all experiments pertaining to a given concept, we further believe that it will require several years to conduct enough experiments to thoroughly assess whether joint experimentation is achieving the results envisioned by the Secretary of Defense and the Congress. To aid the Committee in its oversight of joint experimentation in the interim, we have identified several initial factors that we believe are important to successful joint experimentation. We chose these initial factors based on a synthesis of (1) our review of various documents related to defense transformation and joint experimentation; (2) the sense of the Congress and the reporting requirements regarding joint experimentation contained in the fiscal year 1999 DOD Authorization Act; and (3) discussions with officials involved in joint experimentation, including those at USACOM, a member of the NDP, and those at think tank organizations. The initial factors we have identified and, where appropriate, a brief description of how each factor could be assessed, are as follows. We recognize that a certain amount of trial and error is to be expected because DOD has not conducted a joint experimentation program before.

Institutionalizing the Program

The Joint Experimentation Program is less than a year old. The fiscal year 1999 DOD Authorization Act includes the finding that it is essential that an energetic and innovative organization be established in DOD with the authority to design and implement a process of joint experimentation. The JIMP states that near-term (1999-2000) objectives that support the goals of JV 2010 implementation include establishing and institutionalizing the process for joint experimentation and identifying and institutionalizing the process of resourcing JV 2010 assessments. According to senior USACOM officials involved in the joint experimentation program, the program is not yet institutionalized, that is, permanent. A number of actions have been and are being taken that should help institutionalize the program. Completed actions include the requirement for an annual report to the Congress on joint experimentation, the creation of USACOM's J9 Joint Experimentation Directorate, the validation of over 100 positions for the directorate, the development of a joint experimentation process, and the inclusion of the joint experimentation program in DOD's long-term budget projections. A planned action is to include USACOM's joint experimentation responsibilities in the next revision to the Unified Command Plan.³

Short Versus Mid- and Far-Term Focus for Experimentation

The allocation of resources among the near-, mid-, and far- term phases of experimentation can have an important influence on the program's success in developing new warfighting capabilities. USACOM plans to use about 20 percent of its fiscal year 1999 resources for near-term experimentation, about 75 percent for mid-term experimentation, and about 5 percent for far-term experimentation. Other organizations, such as the combatant commands and the services, already focus on meeting short-term needs and improving current capabilities. We discussed this matter with the Director of the Joint Staff's Directorate for Operational Plans and Interoperability, which is the executive agent and primary Joint Staff proponent for JV 2010 implementation and systems integration. The Director said that while in the future it might be good to focus on the far term, not all of the problems from the Gulf War have been fixed. He also said that there is a need for a mid-term focus for a while and to show some concrete results. As USACOM makes resource allocations for subsequent years, there should be a full dialogue among USACOM, the Joint Staff, the

³This document sets basic guidance to all unified combatant commanders and establishes their missions, responsibilities, and force structure.

Office of the Secretary of Defense, and the Congress regarding the focus of USACOM's efforts, particularly whether they should include near-term experimentation.

Assessing Organizational Structures and Operational Concepts, Creating Common Scenarios, and Using Realistic Adversaries in Experiments

The fiscal year 1999 DOD Authorization Act contains both a sense of the Congress and an annual reporting requirement for joint warfighting experimentation. The sense of the Congress noted the importance of assessing the effectiveness of current and new organizational structures, operational concepts, and technologies in addressing expected early 21st century operational challenges as well as developing scenarios and measures of effectiveness and using realistic adversaries in experiments, called red teaming. It stated that the commander responsible for joint warfighting experimentation should have the authority to integrate and test the system and concepts that result from warfighting experimentation conducted by the armed services and defense agencies. In the annual reporting requirement, the Congress directed that the report include any recommendations the commander responsible for such experimentation considers appropriate regarding, among other things, changes in organizational structure, operational concepts, or joint doctrine.

USACOM's charter and IPLAN call for USACOM to recommend new DOTMLP to the CJCS and the Joint Requirements Oversight Council. Because recommendations regarding DOTMLP are the last step in the joint experimentation process and actual experimentation is just beginning, it will be several years before all experiments relating to a given concept are complete and the results are available. A necessary step is to assure that experimentation includes new organizational structures and operational concepts. Whether experiments examine organizational structures and operational challenges, as well as technology, can be ascertained by examining the hypotheses and designs of specific experiment events. In the longer term, it will be possible to assess the extent to which USACOM recommends changes in organizational structure, operational concepts, and joint doctrine and how the Joint Staff reacts to the recommendations.

USACOM has identified a number of experiment events that it believes address the eight advanced warfighting concepts mentioned previously as having the greatest potential for early experimentation. Each of the military services is exploring concepts for future warfighting that could serve as a basis for joint experimentation. Some of the leveraged events USACOM identified involve service future warfighting concepts such as the Army After Next wargame. By examining service and USACOM

experimentation plans and events, it will be possible to compare the concepts being assessed by the services and USACOM to determine the extent to which the joint experimentation program tests service concepts.

The battle laboratories, research laboratories, and other service organizations we contacted believe that USACOM should provide a common set of experimentation concepts and/or scenarios while leaving leeway to pursue independent scenarios. The combatant commands we contacted believe that Commanders in Chief should be free to set scenarios, although one combatant command believes that USACOM should provide an overview of the future security environment. Examining the details of individual experiments will provide an early indication of the extent to which the services, defense agencies, and combatant commands are using common scenarios and measures of effectiveness in their participation in joint experimentation.

The importance of red teams in experimentation was identified as important by people with whom we discussed benchmarks of joint experimentation progress. Red teams should be allowed to try all constructive and reasonable ways of foiling the experiment's goal or objective. Nothing should be considered "off the table" and thinking asymmetrically or "out of the box" should be strongly encouraged and rewarded. Otherwise the experiments may not generate valid results. The extent to which red teaming is being used should be apparent by examining the specifics of individual experiments.

Linkages to the Services

A successful joint experimentation program should include linkages to all DOD components experimenting with future warfighting concepts and technologies as well as non-DOD components, such as the national laboratories. USACOM plans to rely heavily on leveraging other DOD components' warfighting experiments. USACOM has begun to establish such linkages. As part of these linkages, the components must be willing to allow USACOM to add experimentation elements to their experiments and exercises so that USACOM can leverage them to support its joint experimentation plan. Because planning an experiment can require considerable lead-time, USACOM and the components need to allow sufficient time to add elements to the experiment or exercise. Our queries of 14 DOD components involved with future warfighting found that they were amenable to USACOM participation, and all noted that if adding experiment elements results in increased funding and/or resource needs, then USACOM must be prepared to provide them. Consequently,

USACOM's budget should include funding for USACOM-generated experiments as well as for leveraging others' experiments. An examination of events USACOM has decided to leverage, discussions with USACOM and the services, and an analysis of USACOM's J9 Directorate's budget should provide insight into the extent to which USACOM is leveraging service and other DOD activities.

Ability to Systematically Capture Experiment Data

Because of the emphasis on leveraged experimentation events, USACOM will need to establish a mechanism to systematically capture leveraged experiment results. USACOM officials agree with the need for such a mechanism and, in October 1998, were beginning to examine how to create one. One objective of the J9 assessment division is database management, which includes capturing experiment results. Examining experiment plans and the actual experiments should indicate how well USACOM is capturing data from leveraged events.

Feedback to the Defense Research Community

The science and technology community will play an essential role in providing new technologies that will affect future warfighting, sometimes described as technology push. Likewise, warfighting organizations can provide guidance to the science and technology community about technological improvements that they would find most helpful, sometimes described as technology pull. Therefore, a communication mechanism, including a feedback loop, is essential between the science and technology community and the Joint Staff, USACOM, and warfighters. The CPLAN states that joint experimentation has the potential to shape the science and technology community's efforts and will provide for successful integration of innovative technologies into tomorrow's battlefield. USACOM's joint experimentation insights should be one of the many factors that help decide future science and technology priorities. A periodic examination of experiment outcomes and discussion with the defense research community should provide insight into the extent to which USACOM is providing feedback.

Role of Modeling and Simulation

USACOM's charter states that joint warfighting experiments may include modeling and simulation. The IPLAN states that modeling and simulation will be used throughout the experimentation process, including to conduct predictive analyses for developing plans for individual experiments and to assist planners in identifying problem areas. However, according to DOD modeling and simulation officials, the ability to model or simulate

important warfighting elements, such as information operations, is not well understood or within DOD's current technological capabilities. These capabilities may not be achievable in full for a decade or more, and developing them will require significant basic research. USACOM, in conjunction with the Joint Staff, has produced a database tool to help with, among other things, refining concepts and developing hypotheses and measures of merit and performance. USACOM reports that this tool has become a living document that is supporting modeling and simulation within joint experimentation.

Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD concurred with the report, stating that it is a fair and accurate assessment of DOD's current and projected efforts to develop future joint warfighting capabilities. DOD also stated that we have identified three key factors that are important to a successful joint experimentation program—institutionalization of joint experimentation within DOD, the extent to which joint experimentation includes exploring changes in doctrine and organization as well as technology, and the extent to which USACOM is establishing linkages with other DOD organizations exploring future warfighting—and agreed that these three factors are key to successful joint experimentation. Appendix VII contains the full text of DOD's comments.

Scope and Methodology

To address the issues directed by the Committee's report, including the extent to which the JIMP, defense guidance, the FYDP, modeling and simulation, and DOD's science and technology efforts support the development of future warfighting capabilities and joint experimentation, we reviewed the JIMP, the FYDP, defense guidance, and the NDP report, among other documents. We compared these documents to one another to assess their support for JV 2010 and joint experimentation and talked with Joint Staff, USACOM, and service officials. We also reviewed a number of documents relating to the defense science and technology program and compared these to service identified technology needs to assess how the science and technology program supports the synchronizing of advanced technologies and the development of joint capabilities. We also talked with DOD and service officials involved in modeling and simulation to ascertain their views as to the state of modeling and simulation capability to support the joint experimentation process.

To assess the status of joint experimentation, we talked with officials of USACOM's Joint Experimentation Directorate, the Office of the Secretary of Defense, the Joint Staff, the services, the combatant commands, and the defense agencies, a member of the NDP, and contractors involved in the joint experimentation program. We reviewed key documents involving joint experimentation, specifically the USACOM charter, the IPLAN, and the CPLAN. We developed a series of questions regarding joint experimentation and USACOM's role that we electronically provided to a number of DOD components and tabulated their responses.

We performed our review between May and December 1998 in accordance with generally accepted government auditing standards.

We are providing copies of this report to Senator Robert C. Byrd, Senator Pete V. Domenici, Senator Daniel K. Inouye, Senator Frank R. Lautenberg, Senator Joseph I. Lieberman, Senator Ted Stevens, and Senator Fred Thompson, and to Representative Rod R. Blagojevich, Representative Dan Burton, Representative John R. Kasich, Representative Jerry Lewis, Representative John P. Murtha, Representative David R. Obey, Representative Christopher Shays, Representative Henry A. Waxman, and Representative C. W. Bill Young in their capacities as Chair or Ranking Minority Member of Senate and House Committees and Subcommittees. We are also sending copies of this report to the Honorable William Cohen, Secretary of Defense; the Honorable Louis Caldera, Secretary of the Army; the Honorable Richard Danzig, Secretary of the Navy; the Honorable F.W. Peters, Acting Secretary of the Air Force; and the Honorable Jacob Lew, Director, Office of Management and Budget. Copies will also be made available to others upon request.

If you or your staff have any questions about this report, please contact me at (202) 512-4300. The major contributors to this report were Steve Sternlieb, Assistant Director, Joe Dewechter, evaluator-in-charge, Connie Sawyer, senior evaluator, Dale Wineholt, evaluator, and Elizabeth Ryan, evaluator.

Sincerely yours,

A handwritten signature in black ink that reads "Henry L. Hinton, Jr." with a stylized flourish at the end.

Henry L. Hinton, Jr.
Assistant Comptroller General

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Abbreviations

BRP	Basic Research Plan
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CJCS	Chairman, Joint Chiefs of Staff
CPLAN	Joint Experimentation Campaign Plan
DOD	Department of Defense
DOTMLP	doctrine, organization, training and education, materiel, leadership, and personnel
DTAP	Defense Technology Area Plan
FYDP	Future Years Defense Program
IPLAN	Joint Experimentation Implementation Plan
JIMP	Joint Vision Implementation Master Plan
JV	Joint Vision
JWARS	Joint Warfare System
JWSTP	Joint Warfighting Science and Technology Plan
NDP	National Defense Panel
USACOM	United States Atlantic Command

Joint Vision Implementation Master Plan Provides Guidance

Joint Vision (JV) 2010 is the conceptual template for future joint warfighting and expresses how technological innovations and information superiority will enable the vision's operational concepts. The Joint Vision Implementation Master Plan's (JIMP) stated purpose is to provide joint policy and guidance for implementing JV 2010 and subsequent Chairman, Joint Chiefs of Staff (CJCS) joint vision documents. The Joint Staff delayed publishing the JIMP for over a year because Joint Staff officials said it was difficult to obtain concurrence from all of the services, unified commands, and defense agencies involved. The JIMP contains guidance on the implementation process, project management, and long-range planning; defines roles and responsibilities; and identifies 72 desired operational capabilities.

The JIMP Was Not Intended to Contain Resources or Time Lines

The JIMP was not intended to, nor does it, identify the resources needed to implement JV 2010. Instead, it states that initial start-up funding will be provided by retargeting Joint Staff resources and reprogramming Department of Defense (DOD) resources. Joint Vision implementation funds will then be delineated in future DOD budgets. Planned funding was discussed earlier in this report.

The JIMP was also not intended to, nor does it, contain a time line for implementing JV 2010's new operational concepts. Specifically, the JIMP states that development of a long-range planning process for JV 2010 implementation recognizes that the year 2010 is a way point, not an end point. The long-range planning process is described as helping to focus available time and resources to ensure integrated joint operational capability development. In the July 1996 JV 2010, CJCS referred several times to implementing and/or needing the JV 2010 operational capabilities by 2010. In addition, the U.S. Atlantic Command's (USACOM) July 1998 Joint Experimentation Implementation Plan (IPLAN) states that the end result of the joint experimentation process will be the development of sustained, continuous operational innovations and the realization of desired operational capabilities that meet the full spectrum of joint operational requirements in the year 2010 and beyond. Since then, the Joint Staff has shifted from describing 2010 as a date by which it seeks to achieve desired operational capabilities to a way point on the path to achieving them. The JIMP also states that the development, assessment, and integration of emerging concepts and capabilities are a continuous, never ending journey of discovery.

In commenting on a draft of this report, the Joint Staff stated that it adopted the concept that the year 2010 is a way point, not an end point, to recognize a continual process that explores and develops a capabilities-based force for the future (2010 and beyond). The Joint Staff further stated that developing a capabilities-based force must be an open-ended process and that the "journey" concept does not indicate a lack of resolve to achieve the vision described in JV 2010 by the year 2010 but a determination to build a permanently viable force.

We believe that the CJCS' goal of achieving JV 2010 capabilities by the year 2010 is important because a specific time goal is quantifiable and provides a basis for measuring progress against the goal. A time goal also can be a motivational tool that challenges the leadership to quickly improve capabilities as opposed to getting there when they get there. In addition, setting a common goal for all entities involved in developing future warfighting capabilities has merit because it helps those entities to act synergistically, as opposed to one service, for example, implementing new capabilities by 2007 and another service implementing them by 2012. A time goal also would help DOD assess its progress toward meeting the goal of exploiting the revolution in military affairs that it set in response to the requirements of the Government Performance and Results Act of 1993.

The JIMP Incorporated All
of the National Defense
Panel Operational
Challenges and Desired
Force Characteristics

The Congress authorized establishment of the National Defense Panel (NDP) in the Defense Authorization Act of 1997. The NDP began its work on February 2, 1997, and, in December 1997, issued its report entitled Transforming Defense - National Security in the 21st Century. The report focused on the long-term issues facing U.S. defense and national security and recommended an immediate transformation strategy to meet the challenges of the 21st century. The NDP believes the challenges of the 21st century will be quantitatively and qualitatively different from those of the Cold War and will require fundamental change to national security institutions, military strategy, and defense posture by 2020.

The NDP report identified six operational challenges that the U.S. military must meet in the 21st century, and the JIMP incorporated all of them. The six operational challenges are

- project military power,
- deter and manage weapons of mass destruction,
- maintain U.S. information superiority,
- maintain U.S. lead in space,

- prepare for urban operations, and
- meet transnational challenges.

The NDP report also identified 10 desired force characteristics on which the U.S. military should place far greater emphasis in the 21st century, and the JIMP incorporated all of them. The desired force characteristics are

- systems architectures,
- information system protection,
- information operations,
- automation,
- small logistics footprint,
- mobility,
- stealth,
- speed,
- increased operational and strike ranges, and
- precision strike.

Service and USACOM Plans Are Consistent

Assessment roadmaps, which are plans describing the events required to achieve desired operational capabilities, are contained in the Joint Experimentation Campaign Plan (CPLAN). Originally, the Joint Staff had planned to publish an assessment roadmap for each desired operational capability. Joint Staff officials said that the roadmaps were to cover the first 3 years of JV 2010 implementation rather than serve as roadmaps ending with achievement of the desired operational capabilities. According to the Joint Staff, the roadmaps were originally intended as tools for the Joint Staff JV 2010 coordinating authorities to use in assessing concepts and capabilities within their assigned areas.¹ The designation of USACOM as the executive agent for joint experimentation, however, transferred much of the assessment role from the coordinating authorities to USACOM. The Joint Staff told us that USACOM, in collaboration with the coordinating authorities, services, and combatant commands, will develop experimentation plans that meet the intent of the assessment roadmaps. USACOM's first CPLAN identifies experiment events that are to take place over the next 3 years, through fiscal year 2001, to address new joint

¹Coordinating authorities are parts of Joint Staff organizations, such as the Logistics Directorate, designated as responsible for participating with USACOM in joint experimentation and monitoring progress in support of CJCS oversight.

warfighting concepts and further achievement of the JIMP's desired operational capabilities.

With the transfer of responsibility for assessment roadmaps to USACOM, the development of the first CPLAN, and USACOM's plans to leverage previously scheduled experimentation, service and USACOM plans for experimentation should be consistent. Our review of 42 experimentation events for fiscal years 1999-2001 shows that 37 are leveraged events being conducted by the services, the combatant commands, and the Joint Staff. To help guide USACOM's selection of experiments for the CPLAN, the Joint Staff identified what it considered to be the six most important 21st century challenges, according to a Joint Staff official. These are all three information superiority challenges (battlespace awareness, information transport and processing, and information operations); joint command and control; combat identification; and joint theater logistics management. The initial eight concepts chosen by USACOM for joint experimentation reflected five of these six challenges.

Joint Enablers Are Beginning to Be Addressed

Joint enablers are military capabilities, such as command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), logistics, force protection, and others that allow the military to integrate its operations. The JIMP makes extensive reference to them through its desired operational capabilities. Of the 72 desired operational capabilities the Joint Staff identified to implement JV 2010, 38, according to our analysis, directly relate to joint enablers. Of these 38, 9 relate to command and control, such as situational awareness; 10 relate to focused logistics, such as providing unimpeded access to operational and logistical information for all who need it; and 19 relate to information superiority, such as information transport and processing, battlespace awareness, and information operations. In addition to the 38, 12 other desired operational capabilities relate to full dimensional protection, such as early detection, identification, and dissemination of air and missile threats, which also could be considered joint enablers. USACOM's CPLAN begins to address joint enablers in that it addresses five of the six most important challenges identified by the Joint Staff, which involve some of these types of enablers. Because the current CPLAN does not go beyond 2001, we could not evaluate the adequacy of plans to 2010.

We previously reported that DOD faces many challenges in achieving its information superiority goals and objectives and may need many years of concerted effort to reach them.¹ We reported that for over 30 years (since 1967) DOD has been trying to establish some form of DOD-wide C4ISR architecture. The most important component, which defines the information needs that are the basis for setting system standards and acquiring and protecting systems, has not been completed. Meanwhile, DOD has been developing a number of critical C4ISR systems and information assurance measures without the benefit of a completed and approved architecture. Enforcing compliance with the architecture will be an important factor in achieving information superiority. However, we found that DOD has had difficulty in achieving compliance with related C4ISR policies and decisions.

¹Defense Information Superiority: Progress Made, but Significant Challenges Remain GAO/NSIAD/AIMD-98-257, Aug. 31, 1998).

Defense Guidance and Associated Budget and Planning Review Process Expected to Address Joint Experimentation in 1999

The Secretary of Defense issues guidance annually on the goals, priorities, and objectives for the services and DOD components, called the Defense Planning Guidance. The current defense guidance, issued in April 1998, preceded the Secretary of Defense's charter designating USACOM as executive agent for joint experimentation. Therefore, it makes no mention of who will conduct such experimentation and contains no directives regarding the fielding of advanced technology and preparation of forces for the joint experimentation plan. However, the current guidance emphasizes the importance of transforming U.S. military forces and contains an extensive discussion of JV 2010 and its operational concepts. The guidance was accompanied by the Secretary of Defense's message that described it as aiding the transformation of U.S. forces by serving as a central reference for the joint implementation of the revolution in military affairs. The message also stated that the guidance initiates a series of analytical efforts to support the deliberation of DOD's senior leadership council on matters pertaining to the revolution in military affairs and to provide the basis for future years' planning and programming guidance.

The Current Guidance Does Not Link Planning and Programming Guidance

The defense guidance is divided into two main sections. A strategy section outlines the defense strategy upon which DOD plans and programs will continue to be based. This section states that DOD's commitment to prepare now for an uncertain future includes pursuing a focused modernization effort that replaces aging systems and incorporates cutting-edge technologies and continues to exploit the revolution in military affairs. A guidance section identifies key planning and programming priorities necessary to execute the defense strategy. Within the guidance section, there is planning and programming guidance. Planning guidance sets broad objectives within a program area, such as modernization. Programming guidance contains specific directives as to actions the military services and agencies are to take, such as the number and types of weapon platforms to be procured and the period over which the procurement is to take place.

The guidance section includes a section entitled Prepare: A Transformation Strategy that discusses the revolution in military affairs and JV 2010, describing JV 2010 as providing the conceptual framework for developing the innovative operational concepts, advanced technologies, organizational architectures, and doctrine required to meet a range of security challenges in the early part of the 21st century. This section also states that JV 2010 concepts and capabilities will be explored through information superiority experiments and a series of progressively advanced joint warfighting

experiments. The guidance section also includes a section entitled Prepare: Modernization that includes a discussion of each of the operational concepts of JV 2010, which includes planning and programming guidance sections. However, there appears to be no clear connection between the planning and programming guidance sections. For example, the planning guidance on dominant maneuver, one of JV 2010's operational concepts, states that there are two key objectives for developing dominant maneuver capabilities. These objectives are that forces be (1) lighter, more lethal, and less dependent on logistics tails and (2) sufficiently versatile to, among other things, sustain a high operating tempo. The programming guidance section directs the acquisition of specific weapons systems but makes no mention of what steps are to be taken to meet the objectives described in the planning guidance section. The programming guidance section also does not link the directed acquisitions to the JV 2010 operational concepts or joint experimentation.

**The CJCS's 1998 Program
Recommendations and
Assessment Do Not Address
Joint Experimentation**

According to Joint Staff officials, neither the Chairman's program recommendations nor the Chairman's program assessment addresses advanced technology and preparation of forces in terms of joint experimentation. The program recommendations are issued in February of each year and contain the Chairman's views on what should be included in the guidance. When the program recommendation was issued in February 1998, the Joint Experimentation Plan Report and the USACOM charter had not been formalized. The program assessment provides the Chairman's assessment of the extent to which the services and other DOD components conform to the priorities established in the defense guidance and is issued each August. Joint Staff officials said that the August 1998 program assessment does not address joint experimentation and that the defense guidance is the best place to look for such discussion. Since USACOM had been selected as the joint experimentation executive agent at that point, the program assessment could have, if the Chairman wished, made some comment on joint experimentation. Senior USACOM officials involved in the joint experimentation program believe that joint experimentation was not addressed in August 1998 because USACOM's charter was new and because of the Chairman's desire to wait for USACOM to complete its IPLAN, USACOM's staffing request to be evaluated at the Joint Staff, and the Defense Resources Board to act. These officials anticipate a major change in the 1999 program recommendations and assessment. The Director of the Joint Staff's Directorate for Operational Plans and Interoperability, which is the executive agent and primary Joint Staff proponent for JV 2010 implementation and systems integration, also

expects to see a change in the program recommendations and assessment in 1999.

There is No Complete
Funding Picture for Defense
Transformation

In December 1998, the Office of the Secretary of Defense provided USACOM with a joint experimentation program element in the Future Years Defense Program (FYDP), which contains \$350 million in funding for the period fiscal years 2000-2005. This funding should appear in the FYDP that DOD will submit in fiscal year 1999.

Prior to December 1998, in examining the FYDP submitted in fiscal year 1998, we found few clearly identifiable joint experimentation program elements. The Office of the Secretary of Defense also attempted to identify the programs and resources devoted to defense transformation activities, which include joint experimentation, but abandoned the effort due to definitional problems as to what constituted transformation. However, funding was identified in some instances, such as advanced concept technology demonstrations and service battle laboratories, while activities were identified in other instances with no associated funding. At this point, there is no complete picture of defense transformation-related funding.

Modeling and Simulation for Joint Experimentation Could Take Years to Develop

Many DOD components and national organizations have modeling and simulation capabilities. However, most of these models are predominantly based on force-on-force assessments and attrition warfare concepts that date from the Cold War. The Office of the Secretary of Defense and the services are updating current modeling and simulation capabilities and developing new ones that reflect current and future warfighting. The Joint Staff and USACOM plan to use these new capabilities, which are in varying stages of development, to help implement JV 2010 and joint experimentation.

According to the Defense Modeling and Simulation Office, the ability to model or simulate important warfighting elements, such as command and control, operations other than war, information operations, and human/group behavior representation, is not well understood or within DOD's current technological capabilities. These capabilities may not be fully achieved for a decade or more and will require significant basic research effort to establish an acceptable degree of confidence in their utility. The ability to model or simulate warfighting that occurs 10 or more years in the future is not comfortably within the current capabilities of models and simulations across the diverse alternative futures that USACOM may need to address.

The Under Secretary of Defense for Acquisition and Technology will, through DOD's Executive Council for Modeling and Simulation and the Defense Modeling and Simulation Office, advise and assist USACOM and work to develop necessary modeling and simulation support for joint experimentation, including promulgating modeling and simulation policy, initiatives, and guidance to maximize efficiency and effectiveness by promoting cooperation among DOD components. The Defense Modeling and Simulation Office took advantage of our modeling and simulation meetings by inviting the services, which have most of the capability, to attend each other's meetings with us so that they could learn about each other's capabilities and efforts.

The Office of the Secretary of Defense is developing a new analytic model called the Joint Warfare System (JWARS), which is to be a state-of-the-art, constructive simulation that provides a multisided and balanced representation of joint theater warfare. JWARS is to have four applications: force assessment, planning and execution, system effectiveness and trade-off studies, and concept and doctrine development and assessment. JWARS' limited initial operational capability is scheduled for March 2000,

full initial operational capability is scheduled for May 2001, and full operational capability is scheduled for fiscal year 2002.

At our August 1998 meeting with the JWARS Director, there was limited awareness of JV 2010 and joint experimentation, even though the JWARS model is planned to have important applications that could be helpful to both efforts. He said that joint experimentation was not identified in the JWARS operational requirements document as an objective. He also said that JWARS would not be an ideal tool for joint experimentation because it may require higher resolution than JWARS may be able to provide. After further deliberation, in a subsequent document provided to us by the JWARS Office, the Director stated that JWARS would assist JV 2010 implementation by providing a vehicle to assess current and future military capabilities within JV 2010's four operational concepts and to represent and assist in defining these operational concepts. He also identified several ways that JWARS can contribute to joint experimentation.

USACOM Studied How to Use Modeling and Simulation

USACOM studied the best ways to use modeling and simulation in joint experimentation and has developed a database tool to assist with the joint modeling and simulation effort. Joint experimentation is to rely heavily on simulations to support concept development and the conduct of experiments, initially using existing legacy simulation systems. USACOM intends to use existing simulation capabilities to the maximum extent possible, commercially lease additional capability when required, and develop systems only when there are no other means of meeting the requirement. As joint experimentation matures and concepts and capabilities that cannot be supported by legacy systems are identified, USACOM will identify requirements for future simulation technologies and recommend that its Joint Training and Analysis Simulation Center integrate them into proposals for developing future simulations.

Science and Technology Plans Are Interrelated and Support Future Warfighting Technology Needs

The Deputy Under Secretary of Defense (Science & Technology), within the Office of the Director, Defense Research and Engineering, plays a key role in the science and technology strategic planning process. Critical to the process is a series of interrelated documents—the Defense Science and Technology Strategy, the Basic Research Plan (BRP), the Joint Warfighting Science and Technology Plan (JWSTP), and the Defense Technology Area Plan (DTAP). These documents are linked not only by the process but by the people who prepare them.

The Defense Science and Technology Strategy guides DOD's science and technology program and, in turn, is supported by the BRP, the DTAP, and the JWSTP. The science and technology program includes identifying current and emerging technology candidates for the development of joint capabilities. These science and technology documents present the vision, strategy, plan, and objectives for the defense science and technology planners, programmers, and performers. The BRP provides overall guidance for basic research, presenting the objectives and investment strategy for DOD-sponsored basic research performed by universities, industry, and service laboratories. The DTAP presents the objectives and applied research and advanced technology development investment strategy for technologies critical to DOD acquisition plans, service warfighter capabilities, and the JWSTP. The DTAP takes a perspective across the service and defense agency efforts, thereby charting the total DOD investment for a given technology, and documents the focus, content, and principal objectives of the overall DOD science and technology efforts. The objectives are expressed in the form of Defense Technology Objectives. The BRP and the DTAP lay out broad technology objectives and provide support for achieving priority far-term, joint warfighting capabilities.

The JWSTP provides a joint perspective across the applied research and advanced technology development plans of the services and defense agencies. According to the Deputy Under Secretary of Defense (Science & Technology), that organization, in collaboration with the Joint Staff, combatant Commanders in Chief, the services, and the defense agencies, publishes the JWSTP, in part, to ensure that DOD's science and technology program supports achievement of near- and mid-term joint warfighting capabilities. The JWSTP contains roadmaps for 11 Joint Warfighting Capabilities Objectives, which support achieving the operational concepts of JV 2010 and other critical capabilities for maintaining the warfighting advantage of U. S. forces. Each year, the Joint Requirements Oversight Council reviews and validates these objectives. Each objective roadmap

identifies specific technology advancements that will be developed or demonstrated and the anticipated date when the technology will be available. These specific technology advancements are described in a published volume of Defense Technology Objectives that provides detailed information about Advanced Technology Demonstrations and Advanced Concept Technology Demonstrations.

The Process for Developing the Science and Technology Plans

The process for developing the various plans involves a number of interrelated participants from the Directorate for Defense Research and Engineering, the services, and the defense agencies, with the Deputy Under Secretary of Defense (Science & Technology) being responsible for the overall direction, quality, and content of the DOD Science and Technology Program. The BRP is developed, coordinated, and implemented through the Basic Research Panel, which includes members from the Office of the Deputy Under Secretary of Defense (Science & Technology), the services, and the defense agencies. The BRP is linked with the DTAP and the JWSTP in several ways. One is through scientific planning groups for each of 10 technical disciplines, such as mathematics and computer science, physics, and chemistry. The 10 scientific planning groups are comprised of and have the active participation of both the service laboratories and the warfighters.

The JWSTP is developed by Joint Warfighting Capability Objectives panels, one for each of the 11 objectives, with participation from warfighters, the services, the defense agencies, the Joint Staff, and the Office of the Deputy Under Secretary of Defense (Science & Technology). The DTAP is developed by DTAP panels, one for each of the 11 technology areas, with participation from service and defense agency technical specialists. There is overlap between representatives on the Joint Warfighting Capability Objectives and DTAP panels, according to Defense Research and Engineering officials, and consequent overlap between defense technology objectives in the DTAP and the JWSTP. Technology Area Reviews and Assessments are held for each of the 11 DTAP technology areas, the basic research area, and manufacturing technology program to provide an independent assessment of the science and technology program by world class experts in their fields.

JV 2010-Related Defense
Technology Objectives
Funding Totals \$766 Million
in Fiscal Year 1999

The JWSTP contains \$766 million in fiscal year 1999 funding planned for JV 2010-related defense technology objectives. Table V.1 shows a breakout of the funds by category.

Table V.1: JV 2010-Related Defense Technology Objectives Funding in Fiscal Year 1999

Dollars in millions	
Category	Amount
Dominant maneuver	\$257
Precision engagement	81
Full dimensional protection	181
Focused logistics	85
Information superiority	162
Total	\$766

The Army's and the Navy's
Future Warfighting
Technology Needs Could
Almost Always Be Identified
in Science and Technology
Plans

The services and the defense agencies develop their own science and technology plans with input and guidance from the Deputy Under Secretary of Defense (Science & Technology)'s plans, and we found that the Army's and the Navy's future technology needs were adequately reflected in the plans. For example, in the Army's future warfighting effort, the Army After Next, it identified a short list of desired technologies. We compared the technology short list with the Army's science and technology plan and the Deputy Under Secretary of Defense (Science & Technology)'s plans and found that the Army's plan almost always contained planned efforts addressing the technology needs to some degree, which could also be traced through the Deputy Under Secretary of Defense (Science & Technology)'s plans. We had difficulty doing our comparison because the technology short list frequently provided a general technology heading under which any number of efforts may fall.

The Navy has also identified a future Navy capability options list of desired technologies to support the future Navy and Marine Corps. These technology needs almost always appeared to be addressed in the Deputy Under Secretary of Defense (Science & Technology)'s plans. However, as we found with the Army, the Navy's list frequently provided a general technology heading under which any number of efforts may fall, making it difficult to determine the extent to which these science and technology efforts support the JV 2010 operational concepts.

**Appendix V
Science and Technology Plans Are
Interrelated and Support Future Warfighting
Technology Needs**

The Air Force reports that its strategic plan provides authoritative direction for planners at all Air Force levels, including tailoring capabilities that meet JV 2010. The Air Force has a list of six high-priority areas: space superiority, flexible strike, information dominance, aircraft sustainment, agile combat support, and training for warfighting. However, a senior science and technology official in Air Force headquarters stated that JV 2010 technology needs must be clarified to allow direct linkage with science and technology efforts.

IPLAN Meets the Spirit of Many of the NDP Recommendations for a Joint Forces Command

The NDP made 17 recommendations regarding the framework for a Joint Forces Command, but the Secretary of Defense did not establish it; instead, he made USACOM executive agent for joint experimentation. Therefore, we concluded that the USACOM charter did not address any of the recommendations. We also compared the NDP recommendations to USACOM's IPLAN to assess if it met the spirit of the recommendations. In our opinion, USACOM's IPLAN met the spirit or framework for 10 of the 17 NDP recommendations and part of an 11th recommendation. Table VI.1 compares the NDP recommendations and the USACOM IPLAN.

Appendix VI
IPLAN Meets the Spirit of Many of the NDP
Recommendations for a Joint Forces
Command

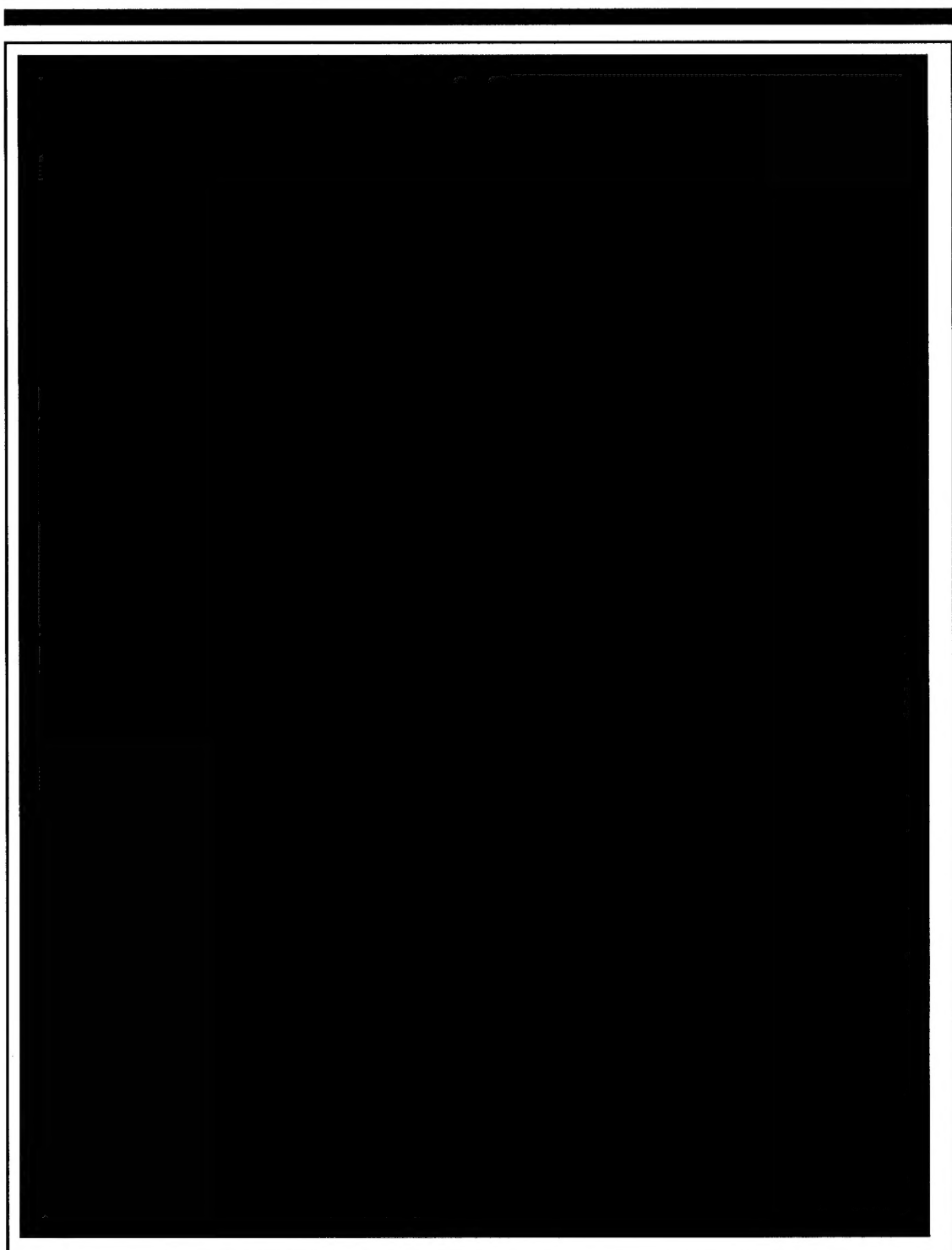
Table VI.1: Comparison of the NDP Recommendations and USACOM IPLAN

NDP report recommendation	IPLAN response
Create a Joint Forces Command responsible for driving the transformation process of U.S. forces.	Yes, in the form of the USACOM J9 Directorate for joint experimentation.
Eliminate USACOM.	No.
Create a Joint Forces Command with appropriate resources.	Yes, USACOM, like any major command, requests resources. USACOM has been authorized both personnel and budgetary resources for joint experimentation.
Create a Joint Forces Command with appropriate requirement authorities.	No.
Create a Joint Forces Command that formulates challenging scenarios.	Yes.
Create a Joint Forces Command that conducts regular field exercises under the aegis of a Joint Battle Laboratory.	Yes.
Create a Joint Forces Command responsible for conducting joint experimentation.	Yes. DOD designated USACOM as executive agent for joint experimentation.
Create a Joint Forces Command that ensures forces possess the appropriate cultural and political awareness of the specific regions to which they will be deployed.	No.
Create a Joint Forces Command responsible for developing and validating joint doctrine for the approval of the Joint Chiefs.	Yes for developing joint doctrine; no for validating it.
Create a Joint Forces Commander with Major Force Program 11-type authority to ensure the ability to support the experimentation program.	No.
Appoint a Joint Forces Commander who would submit an annual report to the Secretary of Defense detailing the conduct of joint exercises, including their number, forces involved, the operational challenges they faced, the exercise results, and the effect of the exercise on the transformation process, to include recommended changes in force structure, doctrine, and resource allocation.	Yes.
Create a Joint Forces Command that would have exercises based on the emerging challenges of 2010-2020 that would take place at joint training centers.	No, the location of training exercises is not yet known.
Have exercises that would use scenarios developed by a Joint Concept Development Center.	Yes.
Have a Joint Concept Development Center that would monitor exercises, determine measures of effectiveness, and evaluate the adequacy of current analytic methodologies, models, and simulations.	Yes.
Make maximum use of service battle laboratories.	Yes.
Have Joint Warfare Centers: the Joint Warfighting Center, the Joint C4ISR Battle Center, the Joint Warfare Analysis Center, the Joint Command and Control Warfare Center, and the Joint Doctrine Center that would report to the Joint Forces Commander; assist in the development of new strategies and task force objectives; establish desired outcomes, measures of effectiveness, and analysis of experimentation results; and develop follow-on experiments.	Yes.
Create a Joint Forces Command responsible for all joint modeling and simulation.	No.

**USACOM's Ability to Meet
Its Charter**

USACOM has taken a number of steps to implement its charter, which are described in the body of this report. These steps include developing a joint experimentation process, identifying resource requirements, and developing an IPLAN and the first CPLAN. USACOM has developed an eight-element joint experimentation process that begins with concept development and ends with integration, resulting in recommendations for new DOTMLP actions that are required to implement the concept and the first joint experiments are to begin in 1999.

Comments From the Department of Defense



Appendix VII
Comments From the Department of Defense

